

Parallel method using MPI for solving large systems of delay differential equations

ABSTRACT

In this paper, we describe a parallel algorithm for solving large systems of first order delay differential equations. The algorithm is based on a variable stepsize variable order block method. The method produces two new approximations in a single integration step. The formulae derivation permits concurrent computation between two processors. The parallel algorithm is implemented by calling the Message Passing Interface (MPI) library. The performance of the sequential and parallel block method is compared with a sequential non-block method. Moreover, the performance of the parallel algorithm is assessed in terms of speedup and efficiency. It is shown from the numerical results that the overall performance of the block method is increased by parallelizing each point in a block.

Keyword: Delay differential equations; Parallel algorithm; Block method; MPI